

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

December 7, 2007

In re application of : Gopisetty, et al  
Group Art Unit 2179 : Examiner: Nicholas Augustine  
Serial No. 10/676,698 : Filed: 09/30/2003

Attorney Docket: ARC920030056US1

Title A SYSTEM AND METHOD FOR GENERATING PERSPECTIVES OF  
A SAN TOPOLOGY

Commissioner for Patents  
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Sir:

Please enter the following revised appeal brief for the above referenced application. The appeal brief fee has been previously paid.

## **APPEAL BRIEF**

### **(i) REAL PARTY IN INTEREST**

The assignee of the application is International Business Machines, Corp.

### **(ii) RELATED APPEALS AND INTERFERENCES**

There are no related appeals or interferences.

### **(iii) STATUS OF CLAIMS**

Claims 1-15 were originally submitted. Claims 1, 9, and 14 have been amended from their original form. Claims 1-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Battat et al (US 5,958,012). The rejection of claims 1-15 is being appealed.

### **(iv) STATUS OF AMENDMENTS**

Claims 1, 9, and 14 have been amended from their original form in the first response to the first office action. These amendments were entered by the Examiner.

### **(v) SUMMARY OF CLAIMED SUBJECT MATTER**

The invention provides a storage area network (SAN) management system capable of generating perspectives of a SAN topology (page 4 Summary of the invention). The system includes a SAN manager program (page 13, line 1 of paragraph 3). The system includes a SAN database wherein information related to devices within the SAN and connections between the devices is maintained (page 14, line 3 of paragraph 1). The system includes a plurality of sensor agents positioned within devices within the

SAN to provide the information in the database (page 14, line 1 of paragraph 1). The SAN manager program can generate an adjacency matrix which is used in conjunction with a topology viewer to generate a requested topology perspective. The generation of the adjacency matrix is described in detail in paragraph 1 on page 18. An illustrative example of an adjacency matrix is shown in Table 1 on page 18.

Listed below are references to each independent claim.

Independent claim 1 is directed to a storage area network (SAN) management system to generate perspectives of a SAN topology. Elements of claim 1 include:

(i) a SAN manager program to monitor a storage area network (SAN) (line 13, third paragraph, page 13), said SAN manager program capable of generating an adjacency matrix (explained in detail in Table 1 and line 8, paragraph 3, on page 17 through line 9, paragraph 1, on page 18), and said SAN manager program capable of facilitating direct data transfers between storage devices without server intervention (line 23, paragraph 3, page 8);

(ii) a SAN management database linked with the SAN manager program, wherein the SAN management database maintains information identifying devices included within the SAN and connections between the devices (93 in Fig. 7, and line 14, third paragraph, on page 13);

(iii) a plurality of sensor agents positioned within devices included within the SAN, wherein the sensor agents gather information associated with events occurring within the SAN and provide the gathered information to the SAN manager for inclusion within the SAN management database (line 1, first paragraph page 14);

(iv) a topology viewer linked to the SAN manager to generate a user requested topology perspective according to data included within the SAN management database and data associated with a previously requested topology perspective (91 in Fig. 7 and line 16, third paragraph, on page 13).

Independent claim 9 is directed to a method for generating a perspective of a SAN topology. Elements of claim 9 include:

- (i) receiving a request to provide a perspective of a SAN topology (160 in Fig 10, line 19, page 16);
- (ii) analyzing the request at a topology viewer and sending the request to a SAN management program for adjacent nodes (162 in Fig 10, line 3 page 17);
- (iii) receiving adjacent nodes from the SAN management program by the topology viewer and comparing them against a topology viewer cache to identify modes already included with an adjacency matrix (166 in Fig 10, line 8 page 17);
- (iv) determining by the topology viewer those nodes which should not be in the adjacency matrix (168 in Fig 10, line 9 page 18);
- (v) calculating data paths within the requested perspective which have not been previously calculated (170 in Fig 10, line 11 page 18 through line 8 page 19); and
- (vi) generating the requested perspective according to both the previously calculated data paths and the calculated data paths (172 in Fig 10, line 8 page 19).

Independent claim 14 is directed to a SAN management system device including system readable code readable by a server system for generating a perspective of a SAN

topology. Claim 14 could be interpreted as a means plus function claim under 35 U.S.C.

112 paragraph 6. The elements of claim 14 include:

(i) logic means for receiving a request to provide a perspective of a SAN topology (160 in Fig 10, line 19, page 16);

(ii) logic means for analyzing the request at a topology viewer and sending the request to a SAN management program for adjacent nodes (162 in Fig 10, line 3 page 17);

(iii) logic means for receiving adjacent nodes from the SAN management program by the topology viewer and comparing them against a topology viewer cache to identify modes already included with an adjacency matrix (166 in Fig 10, line 8 page 17);

(iv) logic means for determining by the topology viewer those nodes which should not be in the adjacency matrix (168 in Fig 10, line 9 page 18);

(v) logic means for calculating data paths within the requested perspective which have not been previously calculated (170 in Fig 10, line 11 page 18 through line 8 page 19);

and

(vi) logic means for generating the requested perspective according to both the previously calculated data paths and the calculated data paths, whereby the perspective includes all SAN devices within the SAN topology which are connected to an identified SAN device and all SAN devices which are accessible to the identified SAN device, wherein the identified SAN device is included within the SAN topology, whereby the SAN device includes a host, a storage device and a switch (91 in Fig. 7 and line 16, third paragraph, on page 13; 172 in Fig 10, line 8 page 19).

Independent claim 15 relates to a method of updating each of a cache of included perspectives of hosts, devices and switches in a SAN, based on a change to the SAN's configuration or an identification of devices missing from the SAN's configuration. Support for this claim is found in the specification on page 14 from line 8 to line15.

**(vi) GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL**

The Examiner has rejected claims 1-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Battat et al (US 5,958,012). Applicants respectfully submit that in view of the teaching in Battat the present invention as claimed in claims 1-15 would not have been obvious to one of ordinary skill in the art.

**(vii) ARGUMENT**

The Examiner has rejected claims 1-15 under U.S.C. 103(a) as being unpatentable over Battat, et al (US 5,958,012). Battat teaches a network management system whereby a virtual reality approach is used to provide a view of a subset of the network. "A network management system allows a network administrator to intuitively manage all components of a heterogeneous networked computer system using views of any component or any set of components. These views are generated in a multi-dimensional, virtual reality environment. Navigation tools are provided that allow an operator to travel through the network hierarchy's representation in the virtual environment using an automatic flight mode" (Battat, Abstract).

The present invention provides a storage area network (SAN) management system capable of generating perspectives of a SAN topology (page 4 Summary of the invention). According to the needs of the operator, these perspectives can be device centric, host centric, SAN node centric, and the like (line 21 page 13). The system includes a SAN manager program (page 13, line 1 of paragraph 3). The system includes a SAN database wherein information related to devices within the SAN and connections between the devices is maintained (page 14, line 3 of paragraph 1). The system includes a plurality of sensor agents positioned within devices within the SAN to provide the information in the database (page 14, line 1 of paragraph 1). The SAN manager program can generate an adjacency matrix which is used in conjunction with a topology viewer to generate a requested topology perspective. The generation of the adjacency matrix is described in detail in paragraph 1 on page 18. An illustrative example of an adjacency matrix is shown in Table 1 on page 18. Both Battat and the present invention are concerned with the management of large networked systems (general networks in the case of Battat, SANs in the present invention). The approach of the two inventions is different. Battat uses a virtual reality technique while the present invention relies on the use of an adjacency matrix when generating a perspective.

In the independent extant claims, 1, 9, and 14 of the present application, explicit reference is made to an adjacency matrix. In the present invention, "adjacency matrix" has a specific meaning and is explained in detail on page 18 as being generated by matrix algebra. The matrix thus generated may have logical or physical adjacency. The adjacency matrix so utilized may be used to generate a device centric perspective, a host centric perspective, a SAN node perspective, etc.

By contrast, the term “adjacency matrix” does not appear in Battat, nor is there any discussion or suggestion on Battat of using matrix algebra to generate the adjacency matrix of the present invention. The Examiner has cited Fig. 17 in Battat as representing an adjacency matrix. However, Applicants respectfully point out that Fig. 17 apparently illustrates a three dimensional physical image of the location group of devices. The Examiner also cites Battat at col. 17, line 17 and col. 18 lines 36 and 51 as relevant to an adjacency matrix. Battat at col. 17, line 17 is apparently describing a system in which an operator may use virtual reality technology to “fly” a user to a selected location or view of a network. Battat at col. 18 lines 36 and 51 is apparently describing physical views of cities and networks in the cities. Applicants respectfully disagree with the Examiner’s characterization of Battat as disclosing or suggesting an adjacency matrix which is defined by matrix algebra and is capable of supporting the generation of a physical or logical view of a SAN.

Applicants do not believe that one skilled in the art would have been able to use the teachings of Battat to arrive at the present invention.

Claims 2-8 are dependent on Claim 1 and are believed to in condition of allowance in the original form.

Claims 10-13 are dependent on Claim 9 and are believed to be condition of allowance in the original form.

#### **(viii) CLAIMS APPENDIX**

1. A storage area network (SAN) management system to generate perspectives of a SAN topology, the SAN management system including:



a SAN manager program to monitor a storage area network (SAN), said SAN manager program capable of generating an adjacency matrix, and said SAN manager program capable of facilitating direct data transfers between storage devices without server intervention;

a SAN management database linked with the SAN manager program, wherein the SAN management database maintains information identifying devices included within the SAN and connections between the devices;

a plurality of sensor agents positioned within devices included within the SAN, wherein the sensor agents gather information associated with events occurring within the SAN and provide the gathered information to the SAN manager for inclusion within the SAN management database; and

a topology viewer linked to the SAN manager to generate a user requested topology perspective according to data included within the SAN management database and data associated with a previously requested topology perspective.

2. The system of claim 1 wherein the SAN includes hosts, storage devices and switches.
3. The system of claim 2 wherein the host comprises a database server or a file server.

4. The system of claim 1 wherein the topology perspective is generated for all devices within the SAN which are visible to a particular host.
5. The system of claim 1 wherein the topology perspective is generated for all devices within the SAN which are visible to a particular storage device.
6. The system of claim 1 wherein a previously requested topology perspective is utilized by the topology viewer in the generation of a new user requested topology perspective.
7. The system of claim 6 the topology viewer includes a memory for storing information pertaining to the previously requested topology perspectives.
8. The system of claim 7 wherein the information pertaining to previously requested topology perspectives includes paths which provide access between devices within the SAN.
9. A method for generating a perspective of a SAN topology, comprising:  
receiving a request to provide a perspective of a SAN topology;  
analyzing the request at a topology viewer and sending the request to a SAN management program for adjacent nodes;

receiving adjacent nodes from the SAN management program by the topology viewer and comparing them against a topology viewer cache to identify modes already included with an adjacency matrix;

determining by the topology viewer those nodes which should not be in the adjacency matrix;

calculating data paths within the requested perspective which have not been previously calculated; and

generating the requested perspective according to both the previously calculated data paths and the calculated data paths.

10. The method of claim 9 wherein the perspective includes all SAN devices within the SAN topology which are connected to an identified SAN device and all SAN devices which are accessible to the identified SAN device, wherein the identified SAN device is included within the SAN topology.
11. The method of claim 10 wherein the perspective includes a graphical map of all devices within the SAN topology which are visible to the identified device, connections between all of the devices included within the graphical map.
12. The method of claim 10 wherein the identified SAN device includes a host, a storage device and a switch.

13. The method of claim 12 wherein the host comprises a database server or a file server and the storage devices comprise JBODs and storage controllers.
14. A SAN management system device including system readable code readable by a server system for generating a perspective of a SAN topology, comprising:
- logic means for receiving a request to provide a perspective of a SAN topology;
  - logic means for analyzing the request at a topology viewer and sending the request to a SAN management program for adjacent nodes;
  - logic means for receiving adjacent nodes from the SAN management program by the topology viewer and comparing them against a topology viewer cache to identify nodes already included with an adjacency matrix;
  - logic means for determining by the topology viewer those nodes which should not be in the adjacency matrix;
  - logic means for calculating data paths within the requested perspective which have not been previously calculated; and
  - logic means for generating the requested perspective according to both the previously calculated data paths and the calculated data paths, whereby the perspective includes all SAN devices within the SAN topology which are connected to an identified SAN device and all SAN devices which are accessible to the identified SAN device, wherein the identified SAN device is included within the SAN

topology, whereby the SAN device includes a host, a storage device and a switch.

15. A method of updating each of a cache of including perspectives of hosts, devices and switches in a SAN, based on a change to the SAN's configuration or an identification of devices missing from the SAN's configuration.

**(ix) EVIDENCE APPENDIX**

There is no evidence presented pursuant to 37 CFR 1.130, 37 CFR 1.131, or 37 CFR 1.132.

**(x) RELATED PROCEEDING APPENDIX**

There are no decisions rendered by a court or the appeals board in any proceeding identified pursuant to paragraph 37 CFR 41.37 paragraph (c)(1)(ii) related to the present application.

Respectfully submitted,

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